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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/896,261 | 06/29/2001 | Richard G. Rateick JR. | 140-99-005 | 8033 |

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12/18/2003

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EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 12/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|---|---------------------------------------|
| Office Action Summary | Application No. 09/896,261 | Applicant(s) RATEICK ET AL. |
| | Examiner Harry D Wilkins, III | Art Unit 1742 |

-- The **MAILING DATE** of this communication appears on the cover sheet with the correspondence address.
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) 8, 13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-12, 15-19 and 21-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-19 and 21-25 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6, 9-12, 15-18 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beck et al (DE 19652326) in view of "Cold Heading", Miller (US 3,890,106) and Rateick, Jr (US 5,728,475).

Beck et al teach (see figures and Derwent abstract) a method of making a wear resistant shoe that includes the step of machining a blank (designated by outline "2") to a final product with a cam engaging portion "14". The blank of Beck does include one section that radially larger than the other portion, and it is this section that is used to form the cam engaging portion. However, Beck et al do not teach the method of making the blank.

Beck et al do not teach first cold-heading one end portion of a generally cylindrical blank or subsequently cold-working the opposite end portion (the "hollow cavity").

"Cold Heading" describes a method of deforming a generally cylindrical blank to create one end which is increased in size radially and decreased in size axially. "Cold Heading" teaches (see col 1 of page 291) that the process has advantages over

machining from suitable stock that include almost no waste material and increased strength from cold working.

Miller teaches (see abstract) the desirability of cold forming only a portion of a blank material so that the un-deformed portion remains soft for subsequent forming operations.

Rateick, Jr teaches (see abstract and figures) a piston shoe. Rateick, Jr teach (see col 3, line 21-27) that the end opposite the cam engaging surface (flange) is crimped (i.e.-cold worked) around a piston head and this causes the flange to be hardened.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the blank "2" of Beck et al by the process of cold heading a generally cylindrical blank because cold heading provides several advantages including leaving almost no waste material and also increased strength due to the cold working (i.e.-work harden) and because deforming only a portion of the blank would leave the rest of the blank in a soft state allowing for further deformation, such as the crimping step of Rateick, Jr. It would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) of Beck et al by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claim 2, Beck et al teach (see figures) and Rateick, Jr teaches (see col. 2, lines 53-54) that the end opposite the cam engaging portion is hollowed out by machining for receiving a rounded piston head.

Regarding claim 3, Rateick, Jr teaches (see col 3, lines 21-28) that crimping is used to cold-work the hollow skirt causing work hardening of the shoe while joining the shoe and piston. Therefore, it would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claims 4 and 5, Beck et al teach (see Derwent abstract) that the shape of the piston shoe is machined from an alloy blank (2). Thus, the machining of the one end portion in order to form a cam engaging wear resistant surface occurs after the cold heading and prior to the crimping step because the opposite end portion must be machined before it is crimped and the machining of the blank occurs as one step applied at both ends at the same time.

Regarding claim 6, Rateick, Jr teaches (see col 2, lines 39-56) that the surface of the shoe is hardened by application of a Borofuse coating. Therefore, it would have been obvious to one of ordinary skill in the art to have applied surface hardening to the shoe in order to increase the wear resistance, as taught by Rateick, Jr, of the shoe.

Regarding claim 9, Beck et al do not expressly teach that the process can be applied to a cobalt alloy. Rateick, Jr teaches that the wear resistant shoe is made of work hardening cobalt alloys, which provide sufficient corrosion resistance. Therefore, it would have been obvious to one of ordinary skill in the art to have used a cobalt alloy because Rateick, Jr teaches that the cobalt alloys provide work hardening and sufficient corrosion resistance. One of ordinary skill in the art would have had a reasonable

expectation of successfully applying cold heading to the cobalt alloy of Rateick, Jr because Haynes 25 (disclosed by Rateick, Jr at col 3, lines 26-28) is able to be cold worked in the solution-treated state by typical cold working operations (for support, see page 402 of "Nickel, Cobalt and Their Alloys" at the top of col 1). Thus, one of ordinary skill in the art would have expected that Haynes 25 could be cold worked by any conventional means, including cold heading.

Regarding claim 10, Beck et al teach (see Figures and Derwent abstract) a method of making a wear resistant shoe that includes machining to finished dimensions to form a cam engaging surface.

Beck et al do not teach that the machined portion is first work hardened to a substantial depth or that surface hardening is applied to the machined portion.

"Cold Heading" describes a method of deforming a generally cylindrical blank to create one end which is increased in size radially and decreased in size axially. "Cold Heading" teaches (see col 1 of page 291) that the process has advantages over machining from suitable stock that include almost no waste material and increased strength from cold working.

Miller teaches (see abstract) the desirability of cold forming only a portion of a blank material so that the underformed portion remains soft for subsequent forming operations.

Rateick, Jr teaches (see col 2, lines 39-56) that the cam engaging surface of the shoe is hardened by application of a Borofuse coating.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the blank "2" of Beck et al by the process of cold heading a generally cylindrical blank because cold heading provides several advantages including leaving almost no waste material and also increased strength due to the cold working (i.e.-work harden) and because deforming only a portion of the blank would leave the rest of the blank in a soft state allowing for further deformation, such as the crimping step of Rateick, Jr. It would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) of Beck et al by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claims 11, Beck et al teach (see Figures and Derwent abstract) that the process includes machining a hollow skirt out of the opposited end for receiving a rounded end of a piston rod.

Regarding claim 12, Rateick, Jr et al teach (see col 3, lines 21-27) crimping the hollow skirt about the rounded end of a piston rod causing work hardening or the cylindrical member. Therefore, it would have been obvious to one of ordinary skill in the art to have crimped the opposite end of the wear resistant shoe (flange) of Beck et al as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claim 15, cold heading causes an upsetting of the metal. Therefore, "Cold Heading" teaches upsetting one end of the rod stock. Otherwise, see above regarding claims 1-3.

Regarding claim 16, "Cold Heading" teaches (see first col) that the process causes work hardening (increased strength due to cold working).

Regarding claim 17, Rateick, Jr teaches (see col 2, lines 39-52) that the process of making the shoe includes surface hardening by treatment with a Borofuse coating. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the surface hardening treatment of Rateick, Jr to the wear resistant shoe because the Borofuse coating causes an increase in wear resistance, thus increasing the lifetime of the shoe.

Regarding claim 18, Rateick, Jr teaches (see col 2, lines 26-28) that the crimping step causes work hardening.

Regarding claims 23-25, Rateick, Jr teaches (see col. 2, lines 24-38 and 53-54) using Haynes 25 for making the wear resistant shoe and that this alloy is non-corrosive in aircraft fuel, while also providing corrosion resistance, wear resistance and cold workability.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beck et al (DE 19652326) in view of "Cold Heading", Miller (US 3,890,106) and Rateick, Jr (US 5,728,475) as applied to claims 1-6, 9-12 and 15-18 above, and further in view of Harada (JP 56-084468).

The teachings of Beck et al, "Cold Heading" and Rateick, Jr are described above in paragraph no. 6. Beck et al, "Cold Heading" and Rateick, Jr do not teach that the surface hardening is carried out by application of a TiN material.

Harada teaches (see English abstract) applying a TiN coating onto a Co-based alloy in order to impart excellent wear and corrosion resistance to the alloy.

Therefore, it would have been obvious to one of ordinary skill in the art to have substituted the TiN coating of Harada for the Borofuse coating of Rateick, Jr because the two coatings are functional equivalents, because both provide increased wear resistance for the surface of a Co-based alloy.

5. Claims 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being clearly unpatentable over Rateick, Jr (US 5,728,475) in view of Davidson (US 4,003,765).

Rateick, Jr teaches the invention substantially as claimed. Rateick, Jr teaches (see col 2, lines 53-54 and figure 1) a process that includes machining a piece of rod stock to form a wear resistant shoe including a cam engaging wear resistant surface 12 and a hollow region 17, followed by (see col 2, lines 57-64) heat treatment of the hollow end of the rod stock to restore ductility and finally (see col 3, lines 21-28) crimping the periphery of the hollow region about a rounded end of a piston rod.

However, Rateick, Jr does not teach that the process starts with hardened rod stock.

Davidson teaches (see abstract) a cobalt base alloy and a heat treatment for hardening the alloy. The alloy has similar composition to Haynes 25. The advantages of the hardening process include (see col 2, lines 36-54) improved hardening characteristics while maintaining ductility.

Therefore, it would have been obvious to one of ordinary skill in the art to have utilized hardened material, such as that of Davidson, as the starting material, because it

starts with an increased hardness (thus, providing more wear resistance) while maintaining sufficient ductility to be processed further.

Regarding claim 21, the process of Rateick, Jr. also includes (see col 2, lines 39-44) a step of hardening the surface of the machined cam engaging surface (when the shoe is treated with a Borofuse coating).

Regarding claim 22, Rateick, Jr teaches (see col 3, lines 26-28) that the cold working (crimping) causes work hardening of the shoe.

Response to Arguments

6. Applicant's arguments filed 10 October 2003 have been fully considered but they are not persuasive. Applicant has argued that:

- a. Beck, in all embodiments, forges the entire intermediate product, thus work hardening both the "glide face" and the socket region;
- b. "Cold Heading" does not contain a reference to using the process to form a wear resistant shoe;
- c. Miller is not related to the formation of a wear resistant shoe nor using "Cold Heading";
- d. Neither "Cold Heading" nor Miller suggest a modification to the manufacturing process of Beck;
- e. Changing the manufacturing method of Beck to include cold heading would require a significantly different die design than those used therein; and,
- f. Beck teaches away from using a pre-hardened stock material.

In response to Applicant's first argument, this is not contested, but the changes to the manufacturing method suggested by "Cold Heading" and Miller do suggest separately cold working each end,

In response to Applicant's second argument, while "Cold Heading" does not contain a specific reference to a wear resistant shoe, it provides one of ordinary skill in the art with the motivation to use cold heading to form the intermediate product of Beck.

In response to Applicant's third argument, while Miller does not describe cold heading, one of ordinary skill in the art would realize that the generic reference to cold working would also apply to cold heading.

In response to Applicant's fourth argument, the Examiner disagrees. The Examiner reads "Cold Heading" and Miller as suggesting the process of cold heading to provide work hardening to one end of a blank, while leaving the other end in an unworked state, thus preserving the cold workability of that other end for subsequent processing. This directly relates to the wear resistant shoe of Beck because of the crimping step (taught by Rateick, Jr), which would require that the other end maintain cold workability (i.e.-sufficient ductility) so that it could be processed by crimping.

In response to Applicant's fifth argument, while it may require significant changes to the machinery/equipment required to perform the method of Beck by using cold heading as suggested by "Cold Heading" and Miller, economic feasibility is not a requirement under 35 USC 103. The prior art must only teach the desirability of the combination, not that it must be economic feasible.

In response to Applicant's sixth argument, while Beck does teach using stock material that is not pre-hardened, Davidson teaches that there are some advantages to using that inventive product, mainly that the annealed hardened stock material provides higher hardness (i.e.-higher wear resistance) while still maintaining ductility. This ductility allows the alloy to be deformed by cold working, even in the hardened state. Thus, Beck and Davidson are not contradictory. Davidson is an improvement over the method of using basic stock material as suggested by Beck.

As discussed during the interview of 4 September 2003, based on the contents of that conversation, it appears that based on the state of the art leading up to the invention, that there was no reasonable expectation of successfully applying cold heading to Co-alloys, particularly for forming a wear resistant shoe, and as such, evidence supporting this would remove the rejection of independent claims 1, 10 and 15. However, no evidence has been presented in the prosecution of this application that supports the facts discussed during that interview, thus, the rejections have been maintained.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

Art Unit: 1742

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

hdw

Harry D Wilkins, III
Examiner
Art Unit 1742

ROY KING
SUPERVISOR, PATENT EXAMINER
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